WOODEN BRICK

CROSS REFERENCE TO RELATED APPLICATIONS

This application claims priority from United States Provisional Patent Application Serial Number 60/448,455 filed on February 21, 2003, entitled "WOODEN BRICK", which is expressly incorporated by reference herein.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to methods and materials for constructing building structures, and more particularly, to ways of using lower-grade timber to efficiently construct sound and attractive structures.

2. Description of Related Art

Lumber is a popular and effective building material; however, it does have a number of shortcomings. Perhaps most significant among these shortcomings, lumber is becoming increasingly difficult to find in long, straight, unblemished pieces. And even when such pieces of lumber are available, they have generally become far too expensive to use as mere building materials, for example as framing members.

This scarcity has provided an opportunity to rethink the methods and materials we use to construct building structures. There is in effect a hunt to find new ways to use old materials and to find new materials to use in the old ways. The first kind of innovation has included salvaging wood-scrap to created oriented strand board ("OSB") and glued laminated timber ("glulam"). The second kind of innovation has included casting aluminum into framing members, such as studs and joists. The best of such innovations yield laborsaving methods to produce attractive and sound structures from scrap materials.

SUMMARY OF THE INVENTION

The present invention is directed to a way of using lower-grade timber to efficiently construct sound and attractive structures.

According to one aspect of the present invention, there is provided a method of first staggering a number of boards together, such that the boards' respective adjacent faces abut and at least one of the boards' respective edges and the boards' respective ends collectively form a predetermined tongue-and-groove coupling, and then fixing together the boards so staggered into a brick. The predetermined tongue-and-groove coupling might be symmetric and fixing might be accomplished using chemical bonding.

The method also might include cutting the boards to the same nominal dimensions before staggering them and aligning in a common plane the respective edges of a selected group of boards.

The method might also include creating a raceway for utilities to pass through the brick, for example electrical cabling. The raceway might be cut through the brick or might be formed as a gap that passes through the brick between two separated portions of a board. Additionally, a raceway could be created by cutting one of the boards to a smaller nominal dimension than the other boards.

Finally, the method might also include fabricating a predetermined cross-coupling into the brick.

According to another aspect of the present invention, there is provided an apparatus having a number of boards staggered together, such that the boards' respective adjacent faces abut and at least one of the boards' respective edges and the boards' respective ends collectively form a predetermined tongue-and-groove coupling, and a way to fix the plurality of boards together so staggered into a brick.

The predetermined tongue-and-groove coupling might be symmetric and the boards might be fixed with a chemical bonding agent.

The boards might be cut to the same nominal dimensions before staggering and one group of the boards might be staggered such that those boards' respective edges are aligned within a common plane.

The apparatus might also include a raceway through the brick to pass utilities, for example pipes carrying water or heating fuel. The raceway might follow a gap that passes through the brick between two separated portions of a board. Additionally, if one board in the brick had a smaller nominal dimension than other boards, the raceway could follow the smaller board substantially perpendicular to its smaller nominal dimension.

Finally, the apparatus might include a cross-coupling on at least one of a face and an edge of the brick. This cross-coupling might be proximate one end of the brick.

Further aspects and advantages of the present invention will become apparent upon considering the following drawings, description, and claims.

DESCRIPTION OF THE INVENTION

The invention will be more fully illustrated by the following detailed description of specific embodiments in conjunction with the accompanying drawing figures. In the figures, similar components and/or features may have the same reference label. Further, various components of the same type may be distinguished by following the reference label with a second label or a third label that distinguishes among the similar components. If only the first reference label is identified in a particular passage of the detailed description, then that passage describes any one of the similar components having the same first reference label

irrespective of the second reference label or third reference label.

1. Brief Description of the Drawings

Figure 1 is an isometric view of a wooden brick according to a first embodiment of the invention.

Figure 2 is a plan view of the brick of Figure 1.

Figure 3 is a front elevational view of the brick of Figure 1.

Figure 4 is a right-side elevational view of the brick of Figure 1.

Figure 5 is an isometric view detailing one of the pieces of lumber in the brick of Figure 1.

Figure 6 is an exploded isometric view of the brick of Figure 1, emphasizing the relative position of the pieces of lumber.

Figure 7 is an exploded plan view of the brick of Figure 1, emphasizing the relative position of the pieces of lumber.

Figure 8 is an exploded front elevational view of the brick of Figure 1, emphasizing the relative position of the pieces of lumber.

Figure 9 is an exploded right elevational view of the brick of Figure 1, emphasizing the relative position of the pieces of lumber.

Figure 10 is a pictorial view of a wooden brick according to a second embodiment of the invention.

Figure 11 is a plan view of the brick of Figure 10.

Figure 12 is a front elevational view of the brick of Figure 10

Figure 13 is a right-side elevational hidden-line view of the brick of Figure 10.

Figure 14 is an isometric view of a wooden brick according to a third embodiment of the invention.

Figure 15 is a plan view of the brick of Figure 14.

Figure 16 is a front elevational view of the brick of Figure 14.

Figure 17 is a right-side elevational view of the brick of Figure 14.

Figure 18 is an isometric detail view of an end portion of the wooden brick of

Figure 14.

Figure 19 is an exploded isometric view of a wall system constructed from wooden bricks according to the first, second, and third embodiments of the invention.

Figure 20 is an isometric view of the wall system of Figure 19.

2. Detailed Description of Specific Embodiments

(a) Structure

The structure of the invention will now be illustrated by way of specific exemplary embodiments shown in the drawing figures and described in greater detail herein.

Figures 1 through 4 show a wooden brick according to a first embodiment of the present invention, generally illustrated at **10a**. The brick **10a** has a top brick-edge **12a-T**, a bottom brick-edge **12a-B**, a right brick-face **14a-R**, a left brick-face **14a-L**, a front brick-end **16a-F**, and an aft brick-end **16a-A**.

Each of the brick-edges **12a** and brick-ends **16a** is characterized by a tongue-and-groove coupling **18a**. The top brick-edge **12a-T** has a top coupling **18a-T** and the bottom brick-edge **12a-B** has a complemental bottom coupling **18a-B**. Similarly, the front brick-end **16a-F** has a front coupling **18a-F** and the aft brick-end **16a-A** has a complemental aft coupling **18a-A**. The brick-faces **14a** are sufficiently finished to form interior paneling or exterior siding.

With reference now to Figures 5 through 9, it can bee seen that the brick **10a** is a laminate structure formed from a number of staggered boards **20a** of similar shape and size. In this embodiment, the brick **10a** is formed from five boards **20a**, each board **20a** being nominally a three-foot long two-by-six. Nevertheless, the size of the boards **20a** can be selected to suit the timber

available and the application specified. For example, if the timber available is of such low grade that it can't yield enough good quality three-foot two-by-sixes for the application, then it might be possible to optimize the timber available by cutting it into a larger number of good quality smaller boards **20a** (i.e. cutting out the bad portions without scraping good quality but shorter lumber) to form more, but smaller, bricks **10a**.

As best seen in Figure 5, a typical such board **20a** has a top board-edge **22a-T**, a bottom board-edge **22a-B**, a right board-face **24a-R**, a left board-face **24a-L**, a front board-end **26a-F**, and an aft board-end **26a-A**.

As best seen in Figures 6 through 9, the boards **20a** are grouped into a set of two even-boards **20a-E** and a set of three odd-boards **20a-O**. The odd-boards **20a-O** are disposed with respect to each other such that their board-ends **26a-O** and their board-edges **22a-O** are aligned in respective common planes and their board-faces **24a-O** are parallel. The even-boards **20a-E** are disposed with respect to each other such that their board-ends **26a-E** and their board-edges **22a-E** are aligned in respective common planes and their board-faces **24a-E** are parallel. The odd-boards **20a-O** as a set and the even-boards **20a-E** as a set are disposed with respect to each other such that their respective board-ends **26a-O**, **26a-E** and board-edges **22a-O**, **22a-E** are staggered but their board-faces **24a** are parallel. In this manner, the staggered boards **20a** are disposed to form a brick **10a** having tongue-and-groove couplings **18a** at its top brick-edge **12a-T**, bottom brick-edge **12a-B**, front brick-end **16a-F**, and aft brick-end **16a-A**.

So disposed with respect to each other, the odd-boards **20a-O** and the even-boards **20a-E** are affixed together board-face **24a-O** to board-face **24a-E**. The boards **20a** may be affixed in any suitably robust manner, for example by chemical bond agent, mechanical fastener, or integral joint; however, in this embodiment the adjacent board-faces **24a** are coated with adhesive and adjacent

boards **20a** are pressed together and clamped in place to form the brick **10a**.

With reference now to Figures 10 through 13, a wooden brick according to a second embodiment of the present invention is generally illustrated at **10b.** The second-embodiment brick **10b** is in most respects identical to the first-embodiment brick **10a**, except as detailed below.

The second-embodiment brick **10b** is specially adapted to provide a vertical raceway **28** and a horizontal raceway **30** through which utilities, for example electrical cabling, can pass through the brick **10b**. This adaptation is accomplished through the use of a specially configured center board **20b-C** disposed in a middle position among the number of boards **20b** that comprise the brick **10b**.

As best seen in Figure 11, a vertical raceway **28** passes through the center board **20b-C** proximate its midpoint. The vertical raceway **28** may be formed as a hole bored through the center board **20b-C** or else may result from assembling the center board **20b-C** from a front center board portion **20b-C-F** and a spaced apart but collinear aft center board portion **20b-C-A** that define the vertical raceway **28** between them.

Also as best seen in Figure 11, the center board **20b-C** is shorter than other boards **20b** that comprise the brick **10b**, and thus in this embodiment, yields both a front vertical gap **32-F** in the front coupling **18b-F** and an aft vertical gap **32-A** in the aft coupling **18b-A**. As best seen in Figure 20, when two such bricks **10b** are placed end-to-end such that their respective front coupling **18b-F** and aft coupling **18b-A** engage, their respective front vertical gap **32-F** and aft vertical gap **32-A** together form a vertical raceway **28**.

As best seen in Figures 12 and 13, the center board **20b-C** is also shallower than other boards **20b** that comprise the brick **10b**, and thus in this embodiment,

yields both a top horizontal gap **34-T** in the top coupling **18b-T** and a bottom horizontal gap **34-B** in the bottom coupling **18b-B**. As best seen in Figure 20, when two such bricks **10b** are placed one upon the other such that their respective top coupling **18b-T** and bottom coupling **18b-B** engage, their respective top horizontal gap **34-T** and bottom horizontal gap **34-B** together form a horizontal raceway **30**.

With reference now to Figures 14 through 18, a wooden brick according to a third embodiment of the present invention is generally illustrated at **10c.** The third-embodiment brick **10c** is in most respects identical to the first-embodiment brick **10a**, except as detailed below.

The third-embodiment brick **10c** is specially adapted to provide a corner-joint for bricks **10** to meet at a predetermined intersection angle, in this embodiment ninety degrees. This adaptation is accomplished by both cutting an edge cross-coupling **36,** which is complemental with the bottom coupling **18-B** of other bricks **10,** into the top coupling **18c-T** at either one of the brick-ends **16c** and cutting a face cross-coupling **38,** which is complemental with either the front coupling **18-F** or the aft coupling **18-A** of other bricks **10**, into one of the brick-faces **14c** at the same one of the brick-ends **16c**.

It will be appreciated that equivalent benefits could be achieved by instead cutting an edge cross-coupling (not shown), which is complemental with the top coupling **18-T** of other bricks **10,** into the bottom coupling **18c-B** at either one of the brick-ends **16c.**

It will also be appreciated that, although the cross-couplings **36**, **38** are illustrated as being proximate a brick-end **16c**, they cross-couplings **36**, **38** might also be located elsewhere along the length of the brick **10c**, for example proximate the midpoint.

The fit between adjacent bricks **10,** and in particular between adjacent couplings **18** and between adjacent couplings **18** and cross-couplings **36**, **38,** is best seen in Figures 19 and 20.

The third-embodiment brick **10c** also includes an endcap **40** adapted to fit between the peripheral boards **20c-P** of the boards **20c** that comprise the brick **10c**.

With reference now to Figures 19 and 20, bricks **10** are shown assembled into a wall system **42** that includes a corner-joint **44**. The wall system **42** is formed from both whole-length bricks **10-W** and half-length bricks **10-H** and also third-embodiment bricks **10c** to implement the corner-joint **44**. It will be noted that some of the boards **20** have been chamfered such that the complemental couplings **18** may be fit together more easily.

(b) Operation

With reference first to Figures 1 through 9, the operation of these specific embodiments of the invention will now be described.

A collection of bricks **10** can be formed to meet arbitrary dimensional requirements. In practice, these dimensions will most commonly be dictated by the purpose for which the bricks **10** are to be used or by the grade of timber available to make the boards **20** that comprise the bricks **10**. As a piece of lumber increases in volume, there is a higher likelihood that the timber from which it will be cut will contain a defect somewhere in that volume. Therefore, if only low-grade timber is available to make the boards **20**, more of the timber can be used to make boards **20** if the boards **20** are shorter, because defects can be cut out without having to scrap shorter pieces of good timber. It has been found that a good general dimension for the boards **20** is nominally two inches by six inches by three feet.

As best seen in Figures 5 through 9, the timber is sawn into boards **20** having these nominal dimensions and the boards **20** are dressed such that the board-edges **22**, the board-faces **24**, and the board-ends **26** are respectively substantially parallel. The board-faces **24** may be further dressed to provide a functional or attractive surface for an interior or exterior wall. Additionally, it may be desirable that the boards **20,** or at least some of them or some portion of them, be chamfered, as best seen in Figures 19 and 20.

As best seen in Figures 1 through 4, a number of boards **20** are assembled together board-face **24** to board-face **24**, their board-edges **22** staggered to form a top coupling **18-T** and a complemental bottom coupling **18-B** and their board-ends **26** staggered to form a front coupling **18-F** and a complemental aft coupling **18-A**. In this embodiment, the boards **20** are staggered symmetrically as two groups, the odd-boards **20-O** and the even-boards **20-E**, and the three axes for all of the boards **20** are respectively parallel; however, those skilled in the art will observe that other staggering patterns will also yield beneficial results -- the key being that the staggering produce sound complemental couplings **18** such that various bricks **10** may be soundly coupled together. In this regard, it is convenient to manufacture and assemble blocks having identical couplings **18**; however, this uniformity is not necessary.

The boards **20** being so assembled, an adhesive chemical bonding agent is applied to their board-faces **24** and the boards **20** are clamped together until they bond into laminate bricks **10**.

Those skilled in the art will observe that, conveniently, the complemental couplings **18** can be formed merely through staggering the boards **20** and laminating them together into bricks **10**. In particular, it is not necessary to mill the couplings **18** into the bricks **10**.

With reference now to Figures 10 through 13, it can be seen that the special configuration of a center board **20b-C** produces vertical raceways **28** and horizontal raceways **30**. To produce these benefits most conveniently, before the boards **20** are assembled and laminated together, the center board **20b-C** is sawn shorter and shallower than the other boards **20** and a vertical raceway **28** is created proximate its midpoint, either by a boring or cutting operation or by sawing the center board **20b-C** into a front center board portion **20b-C-F** and an aft center board portion **20b-C-A** with a gap left between them during assembly for the vertical raceway **28**. During assembly, the center board **20b-C** is disposed with respect to the other boards **20** to produce a front vertical gap **32-F** and an aft vertical gap **32-A** and to produce a top horizontal gap **34-T** and a bottom horizontal gap **34-B**.

With reference now to Figures 14 through 18, it can be seen that the cross-couplings **36**, **38** are well suited for manufacturing through a series of cutting operations, for example milling, routing, or dadoing.

With reference now to Figures 19 and 20, it can be seen that a wall system **42** can be conveniently assembled simply by stacking whole-length bricks **10-W** and half-length bricks **10-H** together. The half-length bricks **10-H** are useful because, as with masonry bricks, it is desirable to stack these wooden bricks **10** such that the junctions between the bricks **10** on one level align vertically with the approximate midpoint of the bricks **10** on the adjacent levels.

Adjacent bricks **10** are held together by weight and their respective complemental couplings **18:** front couplings **18-F** mating with aft couplings **18-A** and top couplings **18-T** mating with bottom couplings **18-B**, any vertical gaps **32** or horizontal gaps **34** between them respectively forming vertical raceways **28** and horizontal raceways **30**.

The corner-joint **44** in the wall system **42** is formed by using third-

embodiment bricks **10c**, which have cross-couplings **36**, **38** adapted to engage the couplings **18** of adjacent bricks **10** at a predetermined angle, in this embodiment ninety degrees. It will be noted that the face cross-coupling **38** can be located on either the right brick-face **14c-R** or the left brick-face **14c-L**, and that in this embodiment it alternates with the brick **10** level in the wall system **42** to produce a stronger corner-joint **44**.

Thus, it will be seen from the foregoing embodiments and examples that there has been described a way to make laminate wooden bricks **10**. Each brick **10** is formed as a lamination of boards **20** that have been staggered in a predetermined manner. Each brick **10** has complemental couplings **18** on its edges **12** and ends **16** to securely engage adjacent bricks **10**; however, these couplings **18** need not be machined into the bricks **10**, but instead can result from staggering the constituent boards **20** in the predetermined manner.

While specific embodiments of the invention have been described and illustrated, such embodiments should be considered illustrative of the invention only and not as limiting the invention as construed in accordance with the accompanying claims. It will be understood by those skilled in the art that various changes, modifications and substitutions can be made to the foregoing embodiments without departing from the principle and scope of the invention expressed in the claims made herein.